

from the 3d to 8th, and 11th; in Wisconsin on the 5th and 7th. In the plateau region frost occurred as far south as central Arizona on the 2d and 15th; at Winnemucca, Nev., on the 9th, 20th, and 26th; in extreme north-central California on the 1st, 7th, 9th, 18th, 20th, and 23d; and at Port Angeles, Washington, on the 7th and 8th.

### PRECIPITATION (expressed in inches and hundredths).

The distribution of precipitation over the United States and Canada for June, 1891, as determined from the reports of nearly 2,000 stations, is exhibited on Chart III. In the table of Signal Service data the total precipitation and the departure from the normal are given for each Signal Service station. The figures opposite the names of the geographical districts in the columns for precipitation and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the precipitation is below the normal and subtracting when above.

The distribution of precipitation in the central valleys was irregular, very heavy rainfall occurring in small areas in the states of the middle and lower Missouri valleys.

The monthly precipitation exceeded 10.00 on the east-central coast of Florida, in northwest Iowa, east Kansas, east Nebraska, central Missouri, central Oklahoma Territory, east-central Ohio, and south Mississippi. At California, Mo., a depth of 23.90 was reported, and at Larrabee, Iowa, 19.88 fell.

Over a great part of south California and west Arizona no rainfall was reported, and the monthly precipitation was generally less than 1.00 in California south of the 40th parallel, over the southern plateau region, along the Rio Grande River, at stations along the north coast of the upper lakes, and in the lower Saint Lawrence valley.

The monthly precipitation was generally in excess of the average west of the Mississippi River and north of the 35th parallel, and in an area extending from the upper Ohio valley and south Pennsylvania to Alabama and Mississippi. Precipitation was also in excess of the average in Nova Scotia, and at Boston, Mass. The greatest departure above the normal precipitation occurred in central Tennessee, from central Kansas northward over east South Dakota, over a part of the northeastern slope of the Rocky Mountains, and on the north Pacific coast, where it was more than 2.00, and the most marked departure below the normal precipitation occurred on the south Atlantic coast, where it was more than 4.00, and the deficiency was more than 2.00 in the lower Ohio valley, Louisiana, the lower Saint Lawrence valley, and at Duluth, Minn., Escanaba, Mich., Dubuque, Iowa, Erie, Pa., and New York City.

Considered by districts, the average percentage of the normal in districts where the precipitation was in excess was about as follows: Northern plateau, 210 per cent.; northeast slope of the Rocky Mountains, 170 per cent.; extreme northwest, 166 per cent.; north Pacific coast, 160 per cent.; Missouri Valley and middle-eastern slope of the Rocky Mountains, 140 per cent.; middle plateau, 130 per cent.; southeast slope of the Rocky Mountains, 104 per cent.; Ohio Valley, 103 per cent. In districts where the precipitation was deficient the percentage was about as follows: south Pacific coast, 20 per cent.; southern plateau, 50 per cent.; south Atlantic states and upper lake region, 60 per cent.; middle Atlantic and west Gulf states, lower lake region, middle Pacific coast, and at Key West, Fla., 70 per cent.; New England and the upper Mississippi valley, 80 per cent.; east Gulf states, 90 per cent.

At the following-named stations the precipitation for the current month was the heaviest ever reported for June: Cumberland, Md., 7.67, 4.30 greater than the normal, and 1.83 greater than in 1880; Saint Vincent, Minn., 8.17, 4.79 greater than the normal, and 0.80 greater than in 1888; Huron, S. Dak., 8.08, 4.45 greater than the normal, and 2.21 greater than in 1890; Fort Buford, N. Dak., 7.08, 3.80 greater than normal, and 0.32 greater than in 1888; Fort Custer, Mont., 5.06, 2.44

greater than the normal, and 0.15 greater than in 1888; Fort Shaw, Mont., 6.50, 4.64 greater than the normal, and 1.52 greater than in 1879; Walla Walla, Wash., 3.61, 2.24 greater than the normal, and 1.24 greater than in 1888; Tatoosh Island, Wash., 7.44, 4.25 greater than the normal, and 0.30 greater than in 1888. The greatest precipitation for June occurred in north Louisiana and in east-central Texas in 1889, when the precipitation was 3.00 to 6.00 in excess; along the Pacific coast north of the 40th parallel in 1888, when the excess was 2.00 to 4.00; along the middle and south Pacific coasts in 1884, when the excess was 0.25 to 2.25; in the lower Missouri valley in 1883, when the excess was 5.00 to 6.00; in southeast New England in 1881, when the excess was 3.00 to 5.00; and on the south Atlantic coast in 1876, when the excess was 6.00 to 11.00.

At the following-named stations the precipitation for the current month was the least ever reported for June: New York City, 1.18, 2.23 deficient, and 0.11 less than in 1873; Charleston, S. C., 1.20, 4.08 deficient, and 0.12 less than in 1890; Erie, Pa., 1.22, 2.94 deficient, and 0.97 less than in 1873; and Springfield, Ill., 2.11, 3.30 deficient, and 0.36 less than in 1880. The least precipitation reported for June occurred from east Washington over Montana and the Red River of the North Valley in 1889, when the deficiency was 2.00 to 3.00; along the west Gulf coast in 1881, when the deficiency was 2.00 to 5.00. In 1889, when the precipitation was the heaviest reported for June in north Louisiana and east-central Texas, it was the least reported for that month over the north-central part of the country, and in 1881, when it was greatest over southeast New England, it was the least noted for June on the west Gulf coast.

The precipitation, January to June, 1891, averaged about normal in New England, the middle Atlantic states, the Ohio Valley and Tennessee, on the southeast slope of the Rocky Mountains, and along the Pacific coast. In the extreme northwest, on the northeast and middle-eastern slopes of the Rocky Mountains, and over the southern plateau region it was one-fourth to one-half greater than usual, and in the Missouri Valley and over the plateau region it was about one-tenth greater than usual. At Key West, Fla., the rainfall for the period named averaged about six-tenths, and in the south Atlantic and Gulf states, the Lake region, and the upper Mississippi valley about eight to nine tenths of the average amount.

### DEVIATIONS FROM AVERAGE PRECIPITATION.

The following table shows for certain stations, as reported by voluntary observers, (1) the average precipitation for June for a series of years; (2) the length of record during which the observations have been taken and from which the average has been computed; (3) the total precipitation for June, 1891; (4) the departure of the current month from the average; (5) and the extremes for June during the period of observation and the years of occurrence:

State and station.	County.	(1) Average for the month of June.	(2) Length of record.	(3) Total for June, 1891.	(4) Departure from average.	(5) Extremes for June.			
						Greatest.		Least.	
						Am't.	Year.	Am't.	Year.
Arkansas.		Inches	Years	Inches	Inches.	Inches.		Inches	
Lead Hill.....	Boone.....	4.65	9	6.62	+1.97	7.14	1882	2.18	1890
California.									
Sacramento.....	Sacramento.	0.13	41	0.08	-0.05	1.57	1884	0.00	*
Connecticut.									
Middletown.....	Middlesex...	4.58	29	2.70	-1.88	8.05	1862	0.49	1873

## Deviations from average precipitation—Continued.

State and station.	County.	(1) Average for the month of June.	(2) Length of record.	(3) Total for June, 1891.	(4) Departure from average.	(5) Extremes for June.			
						Greatest.		Least.	
						Am't.	Year.	Am't.	Year.
<i>Florida.</i>		<i>Inches</i>	<i>Years</i>	<i>Inches</i>	<i>Inches</i>	<i>Inches</i>		<i>Inches</i>	
Merritt's Island .	Brevard .....	7.65	13	5.45	-2.20	14.28	1889	3.32	1878
<i>Georgia.</i>									
Forsyth .....	Monroe .....	4.52	17	7.18	+2.66	11.14	1886	1.48	1879
<i>Illinois.</i>									
Peoria .....	Peoria .....	3.82	35	3.31	-0.51	11.18	1882	0.45	1863
Riley .....	McHenry .....	4.28	40	5.06	+0.78	9.68	1869	0.41	1863
<i>Indiana.</i>									
Logansport .....	Cass .....	4.48	18	5.42	+0.94	8.99	1882	0.55	1863
Vevay .....	Switzerland ..	4.86	25	8.66	+3.80	9.50	1890	1.36	1873
<i>Iowa.</i>									
Cresco .....	Howard .....	5.15	18	5.09	-0.06	11.71	1890	2.46	1887
Monticello .....	Jones .....	4.59	36	1.92	-2.67	12.19	1890	0.74	1857
Logan .....	Harrison .....	5.94	25	3.47	-2.47	14.09	1890	0.30	1870
<i>Kansas.</i>									
Lawrence .....	Douglas .....	4.93	25	10.15	+5.22	12.11	1876	1.30	1872
Wellington .....	Sumner .....	4.21	12	5.45	+1.24	7.71	1886	0.48	1890
<i>Louisiana.</i>									
Grand Coteau ..	St. Landry ..	5.56	8	8.23	+2.67	11.31	1886	2.50	1884
<i>Maine.</i>									
Orono .....	Penobscot ..	3.41	21	3.20	-0.21	5.42	1878	0.73	1880
<i>Maryland.</i>									
Cumberland .....	Allegany .....	3.37	19	7.67	+4.30	7.67	1891	0.86	1885
<i>Massachusetts.</i>									
Amherst .....	Hampshire ..	3.75	54	4.82	+1.07	11.69	1862	1.38	64, '84
Newburyport ..	Essex .....	3.00	13	3.79	+0.79	5.94	1879	1.57	1880
Somerset .....	Bristol .....	3.18	19	1.76	-1.42	7.60	1875	1.29	1886
<i>Michigan.</i>									
Kalamazoo .....	Kalamazoo ..	4.79	15	5.84	+1.05	8.10	1883	1.78	1878
Thornville .....	Lapeer .....	3.83	14	2.44	-1.39	9.14	1883	1.92	1886
<i>Minnesota.</i>									
Minneapolis .....	Hennepin .....	4.31	25	4.01	-0.30	9.68	1874	1.53	1889
<i>Montana.</i>									
Fort Shaw .....	Lewis & Clarke	1.86	21	6.50	+4.64	6.50	1891	0.20	1876
<i>New Hampshire.</i>									
Hanover .....	Grafton .....	3.45	49	3.55	+0.10	7.27	1838	0.73	1864
<i>New Jersey.</i>									
Moorestown .....	Burlington ..	3.81	28	3.55	-0.26	7.56	1867	1.01	1864
South Orange ..	Essex .....	3.50	19	1.78	-1.72	6.02	1884	1.00	1885
<i>New York.</i>									
Cooperstown .....	Otsego .....	4.27	37	1.98	-2.29	9.76	1855	0.95	1870
Palermo .....	Oswego .....	3.33	37	1.03	-2.30	8.80	1865	0.70	64, '70
<i>North Carolina.</i>									
Lenoir .....	Caldwell .....	4.17	19	3.20	-0.97	10.30	1884	0.90	1881
<i>Ohio.</i>									
N. Lewisburgh ..	Champaign ..	3.81	19	5.35	+1.54	10.60	1877	1.05	1886
Wauseon .....	Fulton .....	4.15	19	4.21	+0.06	8.53	1881	1.43	1872
<i>Oregon.</i>									
Albany .....	Linn .....	1.57	12	2.03	+0.46	5.31	1888	0.22	1883
Eola .....	Polk .....	1.32	20	2.19	+0.87	5.06	1888	0.05	1883
<i>Pennsylvania.</i>									
Dyberry .....	Wayne .....	2.83	20	1.85	-0.98	5.38	1883	1.13	1873
Grampian Hills ..	Clearfield .....	4.26	19	8.71	+4.45	9.85	1884	1.31	1867
Wellsborough ..	Tioga .....	7.06	12	4.07	-2.99	17.47	1881	2.01	1886
<i>South Carolina.</i>									
Statesburgh .....	Sumter .....	3.39	10	3.80	+0.41	5.35	1886	1.38	1881
<i>Tennessee.</i>									
Austin .....	Wilson .....	5.16	21	4.15	-1.01	8.92	1878	0.66	1874
<i>Texas.</i>									
New Ulm .....	Austin .....	4.11	17	5.01	+0.90	11.33	1873	0.51	1885
<i>Vermont.</i>									
Stratford .....	Orange .....	3.38	18	3.62	+0.24	6.30	1876	1.60	84, '85
<i>Virginia.</i>									
Birdsnest .....	Northampton	3.32	22	2.75	-0.57	8.15	1881	1.00	1882
<i>Washington.</i>									
Fort Townsend ..	Jefferson .....	1.49	16	1.97	+0.48	4.10	1875	0.24	1886
<i>Wisconsin.</i>									
Madison .....	Dane .....	4.36	21	3.68	-0.68	9.31	1880	1.08	1886

\*Generally.

## EXCESSIVE PRECIPITATION.

Monthly precipitation to equal or exceed 10.00 was reported at 9 stations in Kans.; at 7 stations in Nebr.; at 5 stations in Mo.; at 4 stations in Iowa; at 2 stations in Fla.; and at 1 station in Ohio, Miss., Okla. T., and Tex. 23.90 was reported at California, Mo.; 19.88, at Larrabee, Iowa; and 15.40, at West Point, Nebr.

In the last 21 years monthly precipitation to equal or exceed 10.00 in June has been reported for 14 years in Fla.; for 13 years in Iowa; for 11 years in La. and Tex.; for 9 years in Ga. and Ill.; for 7 years in Ala., Kans., Nebr., N. C., and S. C.; for 6 years in Ind., Minn., N. H., and Tenn.; for 4 years in N. Y., Ohio, and Wis.; for 3 years in Mich., Miss., and Pa.; for 2 years in Ark., the Dakotas, N. J., and Va.; and for 1 year in Colo., Conn., Ind. T., Md., R. I., Vt., and Wash. Among exceptionally heavy rainfalls reported for June are, 36.91, at Alexandria, La., and 26.59, at Cheneyville, La., in 1886; and 21.86, at Sylvan Park, Minn., in 1872. In June, 1889, a monthly rainfall of 44.36 was reported at the Island of

Dominica, W. I., and at Colon, U. S. of Colombia, a depth of 31.26 was noted.

Precipitation to equal or exceed 2.50 in 24 hours was reported for 23 stations in Nebr., and on 8 dates, the 14th to 17th and 24th to 27th; at 15 stations in Kans., and on 10 dates, the 1st, 2d, 4th, 16th, 17th, 19th to 21st, 25th, and 26th; at 11 stations in Iowa, and on 7 dates, the 16th to 18th, 23d, 24th, 26th, and 27th; at 9 stations in Tenn., and on 7 dates, the 8th, 9th, 14th, 16th, 17th, 20th, and 21st; at 8 stations in Ga., and on 5 dates, the 7th to 10th and 12th; at 7 stations in Miss., and on 9 dates, the 5th, 6th, 8th to 10th, 12th, 14th, 16th, and 17th; at 7 stations in Wis., and on 8 dates, the 2d, 3d, 7th, 16th, 17th, 19th, 27th, and 29th; at 6 stations in Mo., and on 10 dates, the 1st, 4th to 6th, 8th, 9th, 16th, 20th, 28th, and 29th; at 5 stations in S. Dak., and on 8 dates, the 1st, 2d, 14th to 17th, 26th, and 27th; at 4 stations in Fla., and on 5 dates, the 16th to 18th, 23d, and 24th; at 4 stations in La., and on 4 dates, the 7th and 15th to 17th; at 3 stations in Ill., and on 5 dates, the 3d, 4th, 17th, 18th, and 20th; at 3 stations in Ind., and on 4 dates, the 6th, 7th, 20th, and 23d; at 3 stations in Minn., and on 6 dates, the 12th, 13th, 16th, 17th, 23d, and 24th; at 3 stations in N. Y., and on 4 dates, the 17th, 18th, 20th, and 21st; at 3 stations in N. Dak., and on 4 dates, the 12th to 14th and 27th; at 3 stations in Pa., and on 2 dates, the 18th and 30th; at 3 stations in Tex., and on 4 dates, the 4th, 5th, 6th, and 15th; at 2 stations in Colo., and on 4 dates, the 12th, 13th, 15th, and 16th; at 2 stations in Mich., on the 17th; at 2 stations in S. C., and on 3 dates, the 7th, 16th, and 17th; at 1 station in Ala. on the 30th; at 1 station in Ky. on the 20th; at 1 station in Md. on the 18th; at 1 station in Ohio on the 17th and 19th; at 1 station in Okla. T. on the 1st, 2d, 21st, and 22d; at 1 station in W. Va. on the 7th; and at 1 station in Wyo. on the 4th. Among the heavier rainfalls reported for this period are: 12.95, in 12 hours and 24 minutes, at Larrabee, Iowa, on the 23d-24th; 12.25, at Quanah, Tex., 4-5th; 10.11, at York, Nebr., 25-26th; 6.85, at Lebanon, Mo., 5-6th; and 5.11, at Leoti, Kans., on the 16th.

In the last 21 years precipitation to equal or exceed 2.50 in 24 hours in June has been reported for 18 years in Tex.; for 16 years in Fla. and Ill.; for 14 years in Iowa, Kans., and Mo.; for 12 years in the Dakotas and Ga.; for 11 years in Md., Mich., Minn., Nebr., N. Y., N. C., S. C., and Tenn.; for 10 years in Mass., Ohio, and Pa.; for 9 years in Ala., Ind., and Va.; for 8 years in Ark., La., and Miss.; for 7 years in Conn.; for 5 years in Ind. T.; for 4 years in N. J. and Vt.; for 3 years in Colo., Ky., Me., and Wis.; for 2 years in Del., Mont., N. H., and R. I.; and for 1 year in Idaho, N. Mex., and W. Va. Among the heavier rainfalls reported for this period in June are 22.27, at Alexandria, La., 16th, 1886; 10.70, at Pensacola, Fla., 29th, 1887; and 10.24, at Fort Griffin, Tex., 21st, 1879.

Precipitation to equal or exceed 1.00 in 1 hour was reported at 13 stations in Kans., and on 9 dates, the 1st, 2d, 16th, 19th to 21st, 25th, 26th, and 28th; at 11 stations in Iowa, and on 6 dates, the 16th, 17th, 23d, 24th, 26th, and 27th; at 9 stations in Ala., and on 9 dates, the 2d, 8th, 9th, 11th, 18th, 21st, 22d, 29th, and 30th; at 7 stations in Ill., and on 6 dates, the 1st, 3d, 10th, 15th, 16th, and 21st; at 7 stations in Mo., and on 6 dates, the 4th, 5th, 6th, 10th, 19th, and 26th; at 7 stations in Wis., and on 7 dates, the 2d to 4th, 14th, 16th, 27th, and 30th; at 6 stations in N. Y., and on 5 dates, the 1st, 11th, 16th, 20th, and 21st; at 6 stations in Ohio, and on 4 dates, the 3d, 11th, 17th, and 19th; at 5 stations in Ga., and on 2 dates, the 6th and 8th; at 5 stations in Ind., and on 3 dates, the 8th, 17th, and 23d; at 5 stations in Nebr., and on 5 dates, the 11th, 14th, 16th, 24th, and 26th; at 5 stations in Tenn., and on 3 dates, the 16th, 17th, and 20th; at 5 stations in Tex., and on 4 dates, the 4th, 5th, 21st, and 30th; at 4 stations in Miss., and on 4 dates, the 8th, 9th, 12th, and 13th; at 4 stations in Pa., and on 2 dates, the 17th and 20th; at 3 stations in Colo., and on 2 dates, the 25th and 26th; at 3 stations in Fla., and on 3 dates, the 10th, 17th, and 19th; at 3 stations in La., and on 3 dates,

the 8th, 13th, and 18th; at 3 stations in Minn., and on 3 dates, the 2d, 15th, and 27th; at 3 stations in N. C., and on 3 dates, the 8th, 19th, and 23d; at 3 stations in S. C., and on 3 dates, the 7th, 17th, and 23d; at 2 stations in Ark., and on 2 dates, the 19th and 20th; at 2 stations in Ky., and on 4 dates, the 5th, 6th, 20th, and 29th; at 2 stations in Md., and on 2 dates, the 4th and 18th; at 2 stations in Mich., and on 2 dates, the 17th and 18th; at 2 stations in S. Dak., and on 2 dates, the 13th and 14th; at 2 stations in W. Va., and on 2 dates, the 4th and 30th; at 1 station in Ariz. on the 26th; at 1 station in Mass. on the 26th; at 1 station in N. Dak. on the 14th; at 1 station in Okla. T. on the 2d; at one station in R. I. on the 22d; at 1 station in Vt. on the 1st; and at 1 station in Wyo. on the 4th. Among the heavier rainfalls noted are: 0.85 in 10 minutes at Cleveland, Ohio, on the 3d; 2.80 in 30 minutes, at Madison, Mich., on the 17th; 2.25 in 30 minutes, at Morris, Minn., on the 2d; 2.24 in 30 minutes, at Canton, Ohio, on the 19th; and 4.97 in 40 minutes, at Lebanon, Mo., on the 5th. Excessive rainfall for 5 and 10 minute periods at regular stations of the Signal Service is given in the table of "Maximum rainfall in 1 hour or less."

In the last 21 years precipitation to equal or exceed 1.00 in one hour in June has been reported for 16 years in Kans.; for 15 years in Tex.; for 13 years in Ga. and Iowa; for 12 years in Fla., Ill., Mich., and Nebr.; for 10 years in Tenn.; for 9 years in the Dakotas, Mo., N. C., and Pa.; for 8 years in Ohio and Va.; for 7 years in La., Minn., and S. C.; for 6 years in Ind.; for 5 years in Ark., Miss., N. Y., and Wis.; for 3 years in Ala. and N. J.; for 2 years in Colo., Conn., Ky., Me., Md., Mass., N. Mex., and Wyo.; and for 1 year in Ariz., Idaho, Ind. T., Mont., N. H., and W. Va. Among the heavier rainfalls reported for one hour or less in June are: 0.30 in 3 minutes, 5th, 1885, 0.44 in 5 minutes, 6th, 1883, and 0.50 in 10 minutes, 29th, 1882, at New York City; 0.37 in 5 minutes, at Augusta, Ga., 27th, 1888; 0.40 in 5 minutes, at Bismarck, N. Dak., 19th, 1890; 1.19 in 13 minutes at Anna, Ill., 20th, 1878. For 15-minute periods, 1.28, at Conception, Mo., 10th, 1890; 1.45, at Southington, Conn., 29th, 1879; 1.56, at Fort Randall, S. Dak., 28th, 1873; and 2.02, at Erie, Pa., 17th, 1886. For 30-minute periods, 2.00, at Boston, Mass., 29th, 1879; 2.00, at Alpena, Mich., 24th, 1880; 2.00, at Galveston, Tex., 17th, 1888. 3.03 in 35 minutes at Clear Creek, Nebr., 25th, 1882; and 3.24 in 45 minutes, at Dodge City, Kans., 19th, 1888.

Table of excessive precipitation, June, 1891.

State and station.	Monthly rainfall to inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
<b>Alabama.</b>	<i>Inches.</i>	<i>Inches.</i>		<i>Inches.</i>	<i>h. m.</i>	
Brewton				1.00	1 00	9
Camden				1.20	1 00	20
Fayette C. H.				1.60	1 00	20
Jasper				1.25	1 00	18
Mobile				1.80	1 00	11
Montgomery		2.70	30	1.82	1 00	30
Mountain Home				2.25	2 00	8
Sturdevant				1.46	1 00	22
Valley Head				1.72	0 55	2
Do.				1.69	1 00	21
<b>Arizona.</b>						
Calabasas				2.15	1 20	26
<b>Arkansas.</b>						
Lead Hill				1.00	0 45	19
Paragould				2.00	2 00	20
<b>Colorado.</b>						
Longmont				1.69	1 03	25
Sedgwick		2.53	12, 13			
Springfield		3.09	15, 16			
Wray				1.37	1 00	26
Yuma				1.29	1 00	25, 26
<b>Florida.</b>						
De Land (1)		2.70	16, 17			
Fort Barrancas		3.45	17, 18			
Gainesville		3.00	17	3.00	2 00	17
Orange City				1.60	1 15	19
Tallahassee	10.08					
Tarpon Springs				1.39	1 00	10
Titusville	10.65	2.62	16			
Do.		3.69	23, 24			

Table of excessive precipitation—Continued.

State and station.	Monthly rainfall to inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
<b>Georgia.</b>	<i>Inches.</i>	<i>Inches.</i>		<i>Inches.</i>	<i>h. m.</i>	
Americus		4.00	8, 9	2.10	2 10	8
Atlanta				1.22	0 58	8
Cartersville		2.54	7			
Forsyth		3.15	8	2.00	0 30	8
Gainesville		4.18	10			
Milton		2.62	9, 10			
Poulan				1.11	0 45	6
Toccoa		3.15	7, 8	2.00	1 45	6
Union Point		2.76	12			
Waynesborough		3.10	9			
<b>Illinois.</b>						
Cairo				1.10	0 55	10
East Peoria				1.56	0 50	15
Greenville		2.74	3, 4			
Lacon		2.55	17, 18			
Ottawa				1.24	0 45	21
Pana		2.75	20			
Philo				1.00	1 00	21
Riley				1.38	0 35	1
Sycamore				1.04	1 00	3
White Hall				1.47	0 20	10
<b>Indiana.</b>						
Butler				1.17	0 50	17
Evansville		3.00	23	3.00	2 00	23
Huntingburg		3.00	20			
Marion				1.24	0 30	17
Mount Vernon (2)				1.04	0 40	8
Vevay				1.15	0 30	17
Vincennes		2.76	6, 7			
<b>Iowa.</b>						
Alta	16.02	5.26	16, 17	5.26	5 30	16, 17
Do.		8.30	23, 24	6.60	6 30	23, 24
Atlantic		3.98	17, 18	1.35	0 45	27
Bancroft				2.31	2 00	24
Carroll		2.88	16, 17			
Cedar Falls		2.65	26, 27			
College Springs		2.56	17	2.56	1 45	17
Corning				1.24	1 00	16
Fayette				2.00	1 00	16
Fontanelle		2.60	23, 24			
Hampton				1.88	1 00	27
Larrabee	19.85	12.95	23, 24	12.95	12 24	23, 24
Mason City				1.52	1 00	26
Sanborn	12.28	7.02	23, 24			
Storm Lake	14.70	4.50	17	4.50	3 00	17
Do.		8.34	23, 24			
Washington		3.93	17, 18			
<b>Kansas.</b>						
Altoona	12.14	2.61	2	1.66	1 30	2
Allison				1.35	0 30	19
Dwight		3.20	25	3.20	2 00	25
Elco	11.17			1.65	1 10	1
Do.				2.10	2 00	28
Elk Falls	10.36	2.90	1, 2			
Englewood		3.00	4			
Fort Riley				2.00	2 00	25
Fremont	11.66	2.57	17			
Havensville		3.10	25			
Independence		10.84	3, 25	2.06	1 00	2
La Harpe	11.59	2.80	26	2.78	1 25	26
Lawrence	10.15					
Leoti		5.11	16	3.29	1 00	16
Manhattan (2)		3.00	16, 17			
Marmaton	14.70	2.90	19			
Do.		3.35	21			
Oberlin		2.63	20, 21	1.74	1 00	20
Pauline		4.38	1	2.38	1 00	1
Sedan				1.50	1 30	21
Topeka	10.50					
Toronto		3.11	21	1.38	0 20	19
Tribune		3.85	16			
Wallace (2)				1.00	1 00	16
<b>Kentucky.</b>						
Caddo				1.50	1 00	5
Do.				2.00	0 30	6
Do.				1.00	1 00	20
Franklin		2.65	20			
Shelbyville				1.98	1 30	29
<b>Louisiana.</b>						
Baton Rouge				1.55	1 10	13
Cheneyville				1.94	1 40	18
Girard				1.01	1 00	8
Grand Coteau		3.00	7			
Houma		2.80	16, 17			
Jackson Barracks		3.40	15, 16			
Liberty Hill		2.55	15, 16			
<b>Maryland.</b>						
Cumberland (1)		2.75	18	2.00	1 00	18
Baltimore				1.15	1 00	4
<b>Massachusetts.</b>						
Fiskdale				1.12	0 25	26
<b>Michigan.</b>						
Madison		3.40	17	2.80	0 30	17
Mottville				1.05	0 25	17
Do.				1.23	1 00	18
Pulaski		3.04	17			
<b>Minnesota.</b>						
Alma City		3.97	23, 24	1.36	0 45	15
Morris				2.25	0 30	2
Saint Paul				1.00	0 55	27

Table of excessive precipitation—Continued.

State and station.	Monthly rainfall to inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Minnesota—Continued.		Inches.	Inches.	Inches.	h. m.	
Saint Vincent		4.50	12, 13			
Sheldon		3.50	16, 17			
Mississippi.						
Bay Saint Louis	10.60	2.50	12			
Enterprise		2.60	8			
Mayersville				1.41	1 00	13
Meridian		3.67	8, 9	1.78	0 50	9
Do.				1.52	0 45	9
Moss Point		3.00	16			
Palo Alto		2.55	10			
Ship Island		2.76	14			
Do.		2.87	16, 17			
University				1.50	1 20	9
Vicksburg				2.00	1 00	12
Water Valley		4.00	5, 6			
Missouri.						
Booneville	12.05	2.89	8, 9	1.81	1 20	10
California	23.90	3.50	1			
Do.		3.50	4			
Do.		2.50	5			
Do.		3.00	20			
Conception				1.54	0 45	10
East Lynne	10.37	2.75	28, 29			
Eldon	13.54					
Lamonte (2)		2.75	1	1.69	1 00	6
Lebanon	11.67	6.85	5, 6	4.97	0 40	5
Princeton				1.88	1 10	10
Do.				1.96	1 35	26
Saint Louis (Forest Park)		2.65	16			
Springfield				1.21	1 05	19
Zeitonia				1.25	1 00	4
Nebraska.						
Ashland		2.75	26			
Auburn (1)		2.51	24, 25			
Beaver City		3.23	16			
Beatrice		2.82	24-25			
Crete		3.01	25			
Culbertson (1)				2.12	2 00	11
David City		4.00	25-26			
Franklin		2.64	25			
Fremont		3.00	25			
Genoa		2.90	26			
Harvard		3.25	25			
Long Pine		3.00	25			
Marquette	10.04	4.50	25			
Minden	11.05					
Norfolk				1.56	0 30	24
Oakdale	10.24	5.00	16	5.00	3 00	16
O'Neill		2.60	17			
Ough (2)		2.88	14, 15	2.75	2 00	14
Palmer		3.00	24			
Precept		4.75	16			
Purple Cane	11.38	3.40	25			
Schuyler	11.54	6.95	24, 25			
Valentine		2.96	26, 27	2.54	2 12	26
Weeping Water		3.12	26			
West Point	15.40	7.20	24			
York	13.03	10.11	25-26			
New Jersey.						
Beverly		3.16	17, 18			
Freehold		3.55	17, 18			
Imlaystown		3.05	17, 18			
New York.						
Honeymead Brook				1.12	0 45	1
Humphrey		2.65	20	2.65	2 00	20
Keene Valley				1.25	0 55	11
Le Roy		3.10	21	3.10	2 30	21
Malone				1.40	0 40	11
Oxford		3.57	17, 18			
Perry City				1.30	1 05	16
North Carolina.						
Wadeville				1.25	1 00	19
Weldon				1.39	1 18	23
Wilmington				1.17	1 00	8
North Dakota.						
Church's Ferry		2.64	12			
Grafton		2.50	12, 13			
Do.		3.10	27			
Steele		4.25	14	4.00	1 20	14
Ohio.						
Canton	10.83	3.60	17	1.85	0 30	17
Do.		3.07	19	2.24	0 30	19
Cleveland (Hyde)				0.85	0 10	3
Dayton				1.15	0 35	11
Findlay				1.85	0 30	17
Logan				1.00	0 45	11
McConnellsville				1.58	0 45	11
Oklahoma Territory.						
Buffalo	14.40	4.00	1			
Do.		3.00	2	3.00	3 00	2
Do.		3.00	21, 22			
Pennsylvania.						
Grampian Hills		3.20	30	3.20	2 20	30
Johnstown		2.50	30			
Kilmer				2.00	1 00	17
Pottstown				1.50	1 30	17
Quakertown				2.30	1 30	17
Swarthmore		3.80	18			
Rhode Island.						
Providence (3)				1.70	1 45	22

Table of excessive precipitation—Continued.

State and station.	Monthly rainfall to inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
South Carolina.		Inches.		Inches	<i>h. m.</i>	
Allendale				1.50	1 30	23
Branchville				1.04	0 30	7
Hardeeville		2.86	16, 17	2.73	1 30	17
Yorkville		2.61	7			
South Dakota.						
Cross		2.65	1, 2			
Huron				1.36	1 15	13
Kimball		6.01	15, 16, 17			
Plankinton		2.75	26, 27			
Spearfish		3.00	14	3.00	2 40	14
Saint Lawrence		3.75	15, 16			
Tennessee.						
Chattanooga		2.94	17	1.67	0 53	17
Covington (1)		3.15	16	1.40	0 40	16
Covington (2)		2.81	16, 17			
Dyersburgh (2)		2.50	20			
Grand Junction				1.67	1 00	17
Jacksboro				1.75	1 00	16
Jackson		3.05	14			
McKenzie		2.50	20			
Milan		2.70	21			
Sharp		2.62	9			
Trenton				2.49	1 30	20
Waynesborough		2.80	8			
Texas.						
Arthur City				1.50	1 05	30
Brady		2.99	15			
Quanah	12.25	12.25	4, 5	12.25	7 00	4, 5
Roby				1.25	1 00	21
Round Rock				1.57	1 00	5
Weatherford		2.90	5, 6	2.00	1 25	5
Vermont.						
Cornwall				1.06	0 20	1
West Virginia.						
Charleston		2.78	7			
Point Pleasant				1.25	0 30	30
Wheeling (1)				1.05	1 00	4
Wisconsin.						
Appleton (1)				1.80	1 15	16
Bayfield		3.14	27, 29			
Dodgeville				1.17	1 05	27
Honey Creek		3.02	2, 3			
Janesville		5.10	2, 3			
Kenosha		3.32	2, 3			
Mauston		2.90	17, 19			
Meadow Valley				1.03	1 00	14
Menomonie				1.00	0 30	27
Milwaukee		2.53	2, 3	1.27	0 35	3
Neillsville				1.15	1 00	2
New Holstein		4.60	16			
Viroqua				1.75	0 50	27
Wyoming.						
Fort Fetterman		4.00	4	4.00	1 30	4

Received too late to be used in general discussion for June, 1891.

<b>Kentucky.</b>						
Williamsburgh		3.30	20, 21			
<b>Texas.</b>						
Laredo				1.00	0 20	17

Received too late for publication in May, 1891.

<b>Texas.</b>						
Eagle Pass		3.75	22	1.50	1 00	5
Laredo				2.50	2 00	13
Do.				4.00	22, 23	

## MAXIMUM RAINFALL IN ONE HOUR OR LESS.

The following table is a record of the heaviest rainfall during June, 1891, for periods of five and ten minutes and one hour, as reported by regular stations of the Signal Service furnished with self-registering gauges:

Station.	Maximum fall in—					
	5 min.	Date.	10 min.	Date.	1 hour.	Date.
	Inch.		Inch.		Inch.	
Bismarck, N. Dak.	0.30	14	0.55	14	0.93	14
Boston, Mass.	0.10	22	0.17	22	0.35	2
Buffalo, N. Y.	0.05	21	0.10	21	0.25	21
Cincinnati, Ohio	0.25	3	0.27	3	0.35	3
Chicago, Ill.	0.20	28	0.20?	28	0.34	28
Cleveland, Ohio	0.47	3	0.61	3	0.69	11
Denver, Colo.	0.10	16	0.12	16	0.16	16
Detroit, Mich.	0.29	22	0.45	22	0.74	22
Dodge City, Kans.	0.25	5	0.40	5	0.55	5
Duluth, Minn.	0.10	14	0.11	14	0.30	21

## Maximum rainfall in one hour or less—Continued.

Station.	Maximum fall in—					
	5 min.	Date.	10 min.	Date.	1 hour.	Date.
Eastport, Me.	Inch.		Inch.		Inch.	
Galveston, Tex.	0.25	24	0.30	24	0.40	24
Jupiter, Fla.	0.35	29	0.50	29	1.20	29
Kansas City, Mo.	0.40	19	0.55	19	0.65	14, 19
Key West, Fla.	0.35	16	0.50	16	0.80	16
Marquette, Mich.	0.24	22	0.29	21	0.46	22
Memphis, Tenn.	0.20	15, 24	0.30	24, 25	0.50	24, 25
New York City.	0.25	16, 29	0.40	16	0.70	16, 29
New Orleans, La.*	0.12	16	0.18	16	0.25	16
Norfolk, Va.	0.16	18	0.18	18	0.22	18
Philadelphia, Pa.	0.20	17	0.31	17	0.53	17
Philadelphia Water Works	0.11	21	0.22	21	0.55	17
Portland, Oregon.	0.17	22	0.27	22	0.37	22
Saint Louis, Mo.	0.25	16	0.46	20	1.03	8
Saint Paul, Minn.*						
San Diego, Cal.						
San Francisco, Cal.*						
Savannah, Ga.	0.23	8	0.32	8	0.48	8
Washington City.	0.30	21	0.52	21	0.95	21
Wilmington, N. C.	0.30	8	0.56	8	1.17	8

\* Register not working.

† Not sufficient to register.

## HAIL.

Description of the more severe hail storms of the month is given under "Local storms." Hail was reported as follows: 1st, Ill., Iowa, Kans., Ky., Mo., Nebr., N. H., Tex., Utah, Wis. 2d, Ala., Iowa, Kans., Mo., Nev., N. H., N. Y., Pa., S. Dak.,

Utah, Wis., Wyo., Okla. T. 3d, Ill., Ind., Iowa, Ky., Mo., N. C., Ohio, Okla. T., Tenn., Va., W. Va., Wis., Wyo., S. C. 4th, Mo., N. Mex., Wyo. 5th, Mo., N. Mex., N. C., Tenn., Va., S. C. 6th, Ark., Ga., Ill., Mo., Ohio, S. C., Tenn., Tex., Wash., Wis. 7th, La., Miss., Mont., Pa., S. C., S. Dak. Tenn. 8th, Ala., Miss., Pa., Tenn. 9th, Fla., La., Miss., Mo., N. Dak., S. Dak., Wyo. 10th, Iowa, Miss., Ohio. 11th, Ark., La., N. Mex. 12th, Fla., Nev., N. Mex., N. Dak., Tenn., Utah. 13th, Ark., Kans., Nev., Cal., N. Dak., Utah. 14th, Kans., Nebr., N. Dak., S. Dak., Tex., Wis., Wyo. 15th, Ill., Kans., Nebr., N. Mex., Tenn., Tex., Wyo. 16th, Iowa, Kans., Pa., Tex., Vt. 17th, Pa., Wyo. 18th, La., Ohio, Oregon, Wash., Wyo. 19th, Ark., Kans., Wyo., 20th, Ark., Ill. 21st, Cal., Oregon, Pa., S. Dak. 22d, Mont., N. Mex., Oregon. 23d, Iowa, N. Dak. 24th, Iowa, Minn., Nebr., Wis. 25th, Colo., La., Nebr., Wyo. 26th, Ariz., Mont., Nebr., N. H., N. Y., Pa., Vt., Wyo. 27th, Iowa, Kans., Minn., Mont., N. Mex. 28th, Colo., Ill., Iowa, Kans., Minn., Miss., Mo., S. Dak. 29th, Iowa, Kans., Ky., Miss., N. Mex., Ohio, Tenn. 30th, N. Mex., Pa., S. C., Tenn. Sleet was reported on the 1st at Levan, Utah.

## SNOW (in inches and tenths).

Monthly snowfall was reported as follows: *Colorado*.—Stamford, 9; Climax, 6.5; Carson, 1.5; Breckenridge, 1; Como (near), Fort Lewis, and Red Cliff, trace. *Nevada*.—Palmetto, 6; Austin, 4; Belmont, Eureka, and Pioche, trace. *Oregon*.—Silver Lake, trace. *Utah*.—Mount Carmel, 2; Losee, trace.

## WINDS.

The prevailing winds during June, 1891, are shown on Chart II by arrows flying with the wind. In New England, over the southern and northern plateau regions, and along the middle Pacific coast, the winds are generally from southwest to northwest; along the immediate south Atlantic coast, from south to southwest; along the east and south Florida coasts, in the west Gulf states, the Rio Grande and Missouri valleys, and on the middle and southeast slopes of the Rocky Mountains, from southeast to south; in the east Gulf states and upper Mississippi valley, from east to south; in the upper lake region, from north to east; on the north Pacific coast, from south to west; on the south Pacific coast, from west to northwest; at Tampa, Fla., from the northeast; and in the middle Atlantic states, the interior of the south Atlantic states, the Ohio Valley and Tennessee, the lower lake region, the extreme northwest, on the northeast slope of the Rocky Mountains, and over the middle plateau region, variable.

## HIGH WINDS.

[In miles per hour.]

Wind velocities of 50 miles, or more, per hour were reported at regular stations of the Signal Service, as follows: 2d, 60, se., at Lexington, Ky. 3d, 59, w., at Saint Louis, Mo. 4th, 60, s., at Fort Canby, Wash. 8th, 50 se., at Fort Sully, S. Dak. 9th, 56, se., at Huron, S. Dak. 13th, 56, se., at Huron, S. Dak. 14th, 54, ne., at Bismarck, N. Dak. 17th, 54, s., at Fort Canby, Wash. 18th, 54, w., at Fort Du Chesne, Utah. 21st, 84, w., at Cairo, Ill.; 50, w., at Winnemucca, Nev. 26th, 52, se., at Sioux City, Iowa. 29th, 60, sw., at Lexington, Ky.

## LOCAL STORMS.

**1st.**—A severe thunder-storm, with rain and hail, passed east over Winnebago county, Ill., in a path about 4 miles in width, at 5 p. m.; wind damaged buildings to the extent of about \$5,000, and crops and trees were injured by hail. Heavy thunder-storms occurred in other parts of Illinois on this date. A severe thunder-storm, with high wind, visited Cincinnati, Ohio, and Covington, Ky., in the afternoon. In Covington lightning struck in several places, and a dynamo belonging to the Cincinnati Electric Light Company was reported fused and practically destroyed. Several houses were unroofed by high wind at Shelbyville, Ky. At Sioux City, Iowa, a violent

thunder and rain storm at night caused some damage. At Alta, Iowa, a horse was killed by lightning. A thunder-storm, with heavy rain and light hail, moved e. by ne. over Fairmount, Kans., in the afternoon, flooding houses and washing out railroad tracks. Heavy rain, hail, and thunder-storms in South Dakota washed out railroads and caused other damage. A heavy wind, rain, and hail storm was reported at Darlington, Wis., in the evening.

**2d.**—At Williamstown, Mass., a church was struck by lightning. A heavy storm of wind, rain, and hail caused damage in the Mohawk Valley, N. Y. A wind storm wrecked four houses and caused other damage at Mount Carmel, Pa., in the evening. Severe local storms occurred in northern Ohio, and high wind prevailed throughout the state. A thunder-storm, with high wind, caused some damage at Louisville, Ky. Heavy thunder-storms visited southern Indiana in the afternoon and evening. Severe storms also occurred in the upper Mississippi valley, and from the west part of the Lake region over the Dakotas. At Cadiz, Wis., a thunder-storm, with high wind and hail, moved northeast in the evening, blowing down timber and killing stock. At Duluth, Minn., a schooner was wrecked and the captain was drowned; schooner valued at \$4,500, and cargo at \$5,000. At Watertown, S. Dak., a storm, with light thunder and hail, moved east of north from 3 to 4 p. m., central time, causing some damage to frail buildings. At Hazel, S. Dak., a hail storm, with some thunder and lightning, moved northeast in a path about one-half mile in width at 2.30 p. m., central time; three persons were killed and sixteen buildings destroyed. A heavy thunder and hail storm occurred at Oklahoma City, Okla. T., in the afternoon and evening.

**3d.**—Severe storms occurred from North Carolina and the middle Atlantic states over the Ohio Valley and the upper lake region. A heavy wind and hail storm caused damage to buildings, etc., near Soapstone Mount, N. C. A thunder-storm, with high wind, passed over Wadeville, N. C.; forest and fruit trees were blown down. Considerable damage was caused by a thunder and wind storm at Lynchburgh, Va. At Ox Bow, W. Va., trees were blown down and crops destroyed by a thunder, rain, hail, and wind storm in the afternoon. Damage was also caused to buildings, timber, and